

## REMARKS

In the Office Action, claims 1-18 and 27-36 were rejected under 35 U.S.C. § 102(b) as being anticipated by USP 6,023,566 issued to Belkhale et al. (Belkhale). Claim 19 was also rejected under 35 U.S.C. § 103(a) as being unpatentable over Belkhale. Applicants respectfully  
5 traverse the rejections of claims 1-19 and 27-36. Applicants note with appreciation that the Examiner indicated that claims 20-26 and 37-43 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants have amended claim 1 and added new claims 44-46. Accordingly, claims 1-46 will be pending after entry of this Amendment.

### 10 I.Claims 1-5

Claims 1-5 stand rejected under § 102(b) as being anticipated by Belkhale. Applicants respectfully traverse this rejection.

Claim 1 recites a method that produces a circuit description of a design by:

- (a) selecting a candidate sub-network from the design;
- 15 (b) identifying a set of output functions performed by the sub-network;
- (c) based on the identified set of output functions, retrieving a replacement sub-network from a storage structure that stores replacement sub-networks;
- (d) determining whether to replace the selected candidate sub-network with the replacement sub-network in the design;
- 20 (e) replacing the selected candidate sub-network with the replacement sub-network in the design when the method determines to replace the selected candidate sub-network.

Applicants respectfully submit that Belkhale does not disclose, teach, or even suggest each limitation of claim 1. For instance, Belkhale does not disclose, teach, or even suggest the

separate operations of identifying a set of output functions, retrieving a replacement sub-network from a storage structure based on the set of output functions, determining whether to replace the selected candidate sub-network with the replacement sub-network, and replacing the selected candidate sub-network with the replacement sub-network.

5           Instead, Belkhale discloses a method for technology mapping through the matching of candidate clusters to cells in a technology library based on whether two functions are permutation equivalent (col. 2, lines 53-67 and col. 5, lines 54-60). In Belkhale, the flowcharts shown in Figures 4, 5, and 7 and the discussion related to these Figures only describe the matching process of Belkhale but do not disclose the separate operations of claim 1. Applicants respectfully request  
10       that the Examiner specify the portion(s) of Belkhale that disclose each of the separate operations of identifying a set of output functions, retrieving a replacement sub-network from a storage structure based on the set of output functions, determining whether to replace the selected candidate sub-network with the replacement sub-network, and replacing the selected candidate sub-network with the replacement sub-network.

15           For the reasons given above, Applicants believe claim 1 is in allowable form. Claims 2-5 are dependent upon claim 1, and thus are also allowable for at least the same reasons as claim 1.

## **II. Claims 6-18 and 27-36**

Claims 6-18 and 27-36 stand rejected under § 102(b) as being anticipated by Belkhale. Applicants respectfully traverse this rejection.

20           Claim 6 recites a method that produces a circuit description of a design by:

(a) selecting, from the design, a candidate sub-network that performs several output functions, where the candidate sub-network includes a set of circuit elements;

(b) generating a parameter based on the output functions;

(c) using the parameter to retrieve a replacement sub-network from a storage structure that stores replacement sub-networks; and

(d) replacing the selected candidate sub-network with the replacement sub-network in the design.

5 Applicants respectfully submit that Belkhale does not disclose, teach, or even suggest each limitation of claim 6. For instance, Belkhale does not disclose, teach, or even suggest selecting, from the design, a candidate sub-network that performs several output functions. Belkhale discloses only single output gates in the technology-independent network that is to be mapped using matching processes. For example, Belkhale states that the “gates in the technology-  
10 independent network are generally primitive gates such as AND, OR, NAND, NOR, and INV gates,” (col. 4, lines 33-35). The fact that the method of Belkhale only applies to single output candidate sub-networks is definitively stated on column 5, lines 35-60:

A candidate Boolean function  $f$  is said to match a library cell Boolean function  $g$  if there exists some permutation of the inputs that makes the function  $f$   
15 equal to the function  $g$ , possibly requiring some inversions at the inputs and/or at the output. This notion of equivalence is referred to as NPN equivalence (Negate Permute Negate), and can be more formally stated as follows:

Given a Boolean function  $f$  with inputs  $X_1, X_2, X_3 \dots X_n$ , find a permutation  $P$  and inversions at input  $b_1, b_2, b_3 \dots b_n$  and at output  $b$  such that  
20  $f^b(P(X_1^{b_1} \dots X_n^{b_n}))$  exists in the library.

Note that in the above passage, a candidate function  $f$  matches a library cell function  $g$  if there exists some permutation of the inputs that makes the function  $f$  equal to the function  $g$ , possibly requiring some inversions at the inputs and/or at **the output**. Further, the candidate function  $f$  is described in relation to multiple inputs ( $X_1 \dots X_n$  and  $b_1 \dots b_n$ ) but only in relation to

one **output b**. In addition, each Figure in Belkhale showing circuit networks show only single output gates (see Figures 2A and 3C).

As such, Belkhale does not disclose, teach, or even suggest selecting, from the design, a candidate sub-network that performs several output functions. Therefore, Applicants believe claim 6 is in allowable form. Claims 7-18 and 27-30 are dependent upon claim 6, and thus are also allowable for at least the same reasons as claim 6.

Claim 31 is a computer readable medium claim containing limitations similar to claim 6. Accordingly, claim 31 is patentable over the cited art for the same reasons as stated above for claim 6. Claims 32-36 are dependent upon claim 31, and thus are also allowable for at least the same reasons as claim 31.

### **III. Claim 19**

Claim 19 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Belkhale. Claim 19 is dependent upon claim 6, and thus is also allowable for at least the same reasons as claim 6.

### **IV. New Claims 44-46**

New independent claim 44 recites a method that produces a circuit description of a design by:

- (a) selecting a candidate sub-network from the design;
- (b) identifying a set of at least two output functions performed by the sub-network;
- (c) based on the identified set of output functions, retrieving a replacement sub-network from a storage structure that stores replacement sub-networks; and
- (e) replacing the selected candidate sub-network with the replacement sub-network in the design.

New independent claim 44 contains the “several output functions” limitation of claim 6 which Belkhale does not teach or suggest, as discussed above. As such, Applicants submit that new claim 44 is in allowable form. New claims 45 and 46 are dependent upon claim 44, and thus are also allowable for at least the same reasons as claim 44.

5   **V. Allowable Subject Matter**

Applicants note with appreciation that the Examiner indicated that claims 20-26 and 37-43 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 20-26 and 37-43 are not being rewritten at this time, however, since Applicants believe independent claims 6 and 31 (upon which these claim sets are dependent, respectively) are allowable over the cited reference.

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## CONCLUSION

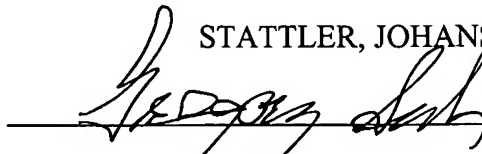
In view of the foregoing, it is submitted that all pending claims, namely claims 1-46, are in condition for allowance. Reconsideration of the rejections and objections is requested. Allowance is earnestly solicited at the earliest possible date.

Respectfully submitted,

Dated:

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